

# Shasta High Robotics, Engineering, and Advanced Manufacturing

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## CTE Pathways/Programs Provided at Shasta High:

1. Advanced Manufacturing
  2. Robotic Applications
  3. Computer Aided Drafting (CAD)
  4. Space Science and Engineering (2 period class)
- ✓ *Exploring Engineering (concentrator course) MUST be taken prior to registration in any of the above courses (completer courses).*
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## Overall Program Description:

The Shasta High School Advanced manufacturing programs offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the manufacturing career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the manufacturing career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in Advanced Manufacturing, Robotics, Computer Aided Drafting, and Production positions.

The content includes but is not limited to providing students with a foundation of knowledge and technically oriented experiences in the study of automation technology, its application in manufacturing, engineering and robotics, and its effect upon our lives and the choosing of an occupation. The content and activities will also include the study of enterprise systems, safety, quality, and leadership skills. This program focuses on transferable skills and stresses understanding and demonstration of the technological tools, machines, instruments, materials, processes and systems in business and industry.

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# Shasta High Robotics, Engineering, and Advanced Manufacturing

## Course: Exploring Engineering

### Who can register?

- **Any student** (Grades 9 – 12). This class is **best taken as a freshman** to allow for completion of one or more of the pathways listed above.



### What does it give me?

- ✓ Elective credit
- ✓ Computer proficiency covered
- ✓ Industry CAD Certification in Autodesk Inventor
- ✓ Necessary skills and training required to move on in ANY CTE pathway.
- ✓ Intelitek CNC Certifications

### Description

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Students will learn the engineering design process, applying STEM standards to hands-on projects. Students will be asked to design solutions to a variety of problems using 3D modeling software and the latest in technology. Students will gain basic knowledge in CNC machining, plasma cutting, laser printing and cutting, 3D printing, and many wood working tools. Students will learn to document each project in an engineering notebook.

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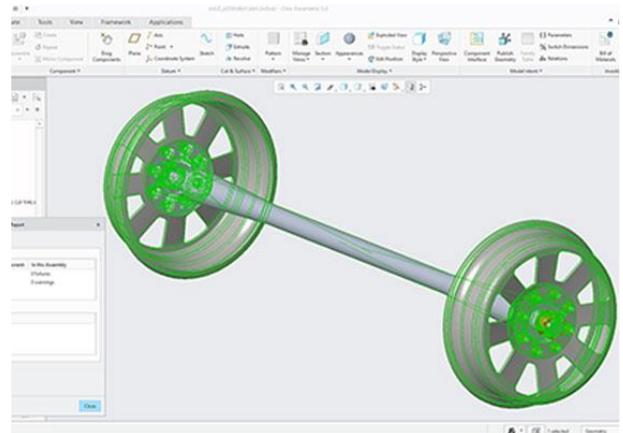
## Course: Advanced Computer Aided Drafting (CAD)

### Who can register?

- **Any student** that has completed Exploring Engineering with a C or better. Special considerations can be made for other students who want to register for this class by instructor approval only. Exploring Engineering **MUST** be taken previous if you want this to count as a CTE pathway completion course.

### What does it give me?

- ✓ Elective credit
- ✓ Computer proficiency covered
- ✓ Industry CAD Certification ANY Autodesk platform and SolidWorks



### Description

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This course provides students with a broad introduction into 2-dimensional and 3-dimensional Computer-Aided Design (CAD) and modeling with a focus on sophisticated assembly modeling and generation of g-code for use in CNC platforms including plasma cutting and CNC milling. Students will learn how to use industry-leading CAD software programs (Autodesk Inventor, Revit, Fusion, and SolidWorks) to model construction projects, and then create and distribute basic, industry-standard architectural drawings

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# Shasta High Robotics, Engineering, and Advanced Manufacturing

## Course: Advanced Manufacturing

### Who can register?

- **Any student** that has completed Exploring Engineering with a C or better.

### What does it give me?

- ✓ Elective credit
- ✓ Computer proficiency covered
- ✓ Industry certification in CNC Machinery
- ✓ Advanced product development skills
- ✓ Welding/Robotic Welding Certifications
- ✓ Intelitek CNC Certifications



### Description

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Advanced Manufacturing is the study of the engineering, design, production, supervision and management utilized to remain competitive in today's technologically advanced manufacturing facilities. Included will be the study of manufacturing techniques used to reduce costs and increase plant efficiency and productivity. Using local industry standards and professionals as a guide, students will use team-centered approaches to process improvement, quality operating systems, and much more. There will be an emphasis placed on engineering and the design process, problem solving including root cause analysis and an iterative approach to resolution implementation.

The course also includes the study of how computer aided design (CAD) tools are used with robotics and automation in a variety of manufacturing processes. Students will use their knowledge of solid modeling skills to design parts and will have the ability to machine them using CNC equipment or print them using the latest Additive (3D) printing technology. Part of the course includes constructing simulated manufacturing processes and programming robotic work cells.

Through classroom lessons and discussions, visits to local manufacturing plants and guest lectures, students will learn about a variety of manufacturing processes and facilities. Utilizing a Profession-based teaching and learning pedagogy, students will study and analyze processes within a variety of manufacturing environments and work side by side with industry professionals immersed in a rich, diverse environment from which they will emerge with a tremendous sense of today's complex and agile manufacturing companies. Emphasis will also be placed on developing interpersonal skills through teamwork in addition to increasing student knowledge of modern manufacturing processes including learning about plant and construction site safety practices, production control processes, environmental operating systems and quality.

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## Shasta High Robotics Classes



### Course: Robotics Applications

#### Who can register?

- Any student that has had any of the following:
  - Computer Science Principles
  - AP Computer Science
  - Exploring Engineering
  - Space Science & Engineering
  - Advanced Manufacturing
  - VEX competition team participation

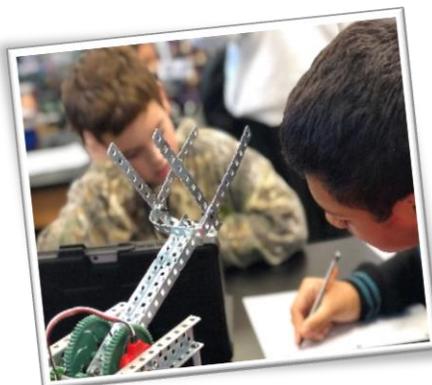
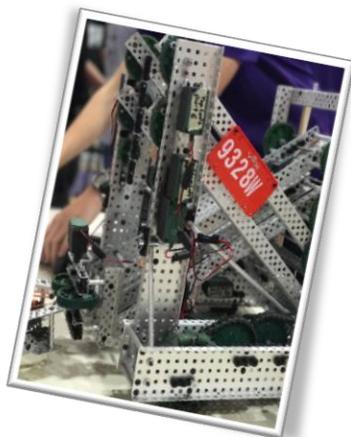


#### What does it give me?

- Another year of lab science

#### Description

This course focuses on showing students to program and use Programmable Logic Controllers (PLCs) in industrial applications that require electrical control. Used in industries around the world, students will gain valuable real world experience. Students will also utilize industrial robotics equipment (robotic arm and PLC control panel) gaining first hand skills and knowledge to prepare them for career-ready occupations. Students will also receive additional robotics training to prepare them for the REC Industrial Certified Robotics exam, to receive their certificates in Industrial Robotics (<http://www.roboticseducation.org/educational-resources/industry-certifications/>).



# Shasta High Robotics, Engineering, and Advanced Manufacturing

## Course: *Space Science and Engineering (robotics)*—two period class

### Who can register?

- Any student that has had CP biology and Chemistry (can also be concurrently enrolled)

### What does it give me?

- Because this class is a two period class, there are many benefits!
  - Lab science credit
  - Elective credit
  - Computer proficiency covered
  - College Credit (Through Shasta College, INDE Intro to Mechatronics)
  - Certifications as a robotic programmer through Carnegie Mellon University



### Description

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This course will teach students how to build and program robotic systems, as well as learn how robotics relates to space exploration through NASA programs and projects. Students will also be able to build VEX competition robots for the chance at competing in local, regional and state robotic competitions!

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## Additional Robotics Activities at Shasta High

- **Project SKOUT (Shasta's Kinect Observing Underground Terrain):** Student built rover that mimics a similar rover developed by NASA's Ames Research Center. BRAILLE (Biologic and Resource Analog Investigations in Low Light Environments). Using an XBOX Kinect system, students are programming, engineering and testing the SKOUT rover to be used in low light environments to map terrain in 3D.
- **Project KnightWolf:** Joint project between Shasta College and Shasta High School. With the help from Sof-Tek (a local electronics manufacturing company), students have designed, soldered and are programming a micro-satellite called a TubeSat. Scheduled to be launched in 2019, the satellite will enter in to Low Earth Orbit (LEO) and transmit data on the magnetic field of the Earth and environmental conditions at the upper levels of the Earth's atmosphere. Eventually the satellite will burn up in the atmosphere after 2-3 months.
- **VEX Competitive Robotics:** Established as a regional competition 3 years ago, the Shasta Robots host a yearly VEX robotics competition called "Battle of the North". This competition is attended by 25-30 teams each year, with hundreds of spectators that attend to watch the competition. In 2018-19, we established a NorCal VEX league, involving 25 teams from around northern California in a fun, competitive atmosphere, where students learn, collaborate and engineering in a positive environment.
- **VEX Robotics Teacher Training (VEX IQ):** Articulation between schools is vital to the success of any program and robotics/advanced manufacturing is no exception. In partnership with Shasta College, the Shasta Robots have trained more than 17 middle school teachers to implement the VEX IQ system to train middle school students on how to program and build robotic systems. This preparation will help to streamline the transition from middle school to high school in the area of robotics and advanced manufacturing.



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